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## Differential Contribution of Antioxidant Enzyme Activity and Lipid Peroxidation by 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin in Guinea Pig Brain Regions

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We examined the differential contribution of antioxidant enzymes as well as lipid peroxidation in the brain regions of guinea pig after exposure to 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD) (1 g TCDD/kg body weight) by biochemical analysis. For this study, male guinea pigs treated with TCDD (1 g/kg body weight, single i.p administration) were sacrificed at 4 weeks after the treatment and brain regions including hypothalamus, thalamus, hippocampus, cortex, cerebellum, and striatum were dissected. The activities of antioxidant enzymes, superoxide dismutase (SOD), and glutathione reductase (GR), and lipid peroxidation in the homogenates of the brain regions were measured. It was found that the brain regions of the normal guinea pig showed differential distribution in copper/zinc-superoxide dismutase (Cu/Zn-SOD) activity; the highest level in cerebellum and hypothalamus and the lowest in hippocampus.

Treatment of TCDD caused the overall increase of the enzyme activity in the all brain regions, especially showing the marked increase in hippocampus. On the other hand, Mn-SOD activity showed no characteristic differential distribution in the brain regions. Our results showed that glutathione reductase activity was broadly distributed in the brain regions of normal guinea pig. When compared with the normal, administration of TCDD led to the regional specific increase of glutathione reductase activity especially in cortex and striatum. Our results further showed that lipid peroxidation was not specific to the brain regions. These results provide strong evidence that, even though the vulnerability to oxidative stress by TCDD is non-specific to brain region, TCDD differentially contributes to the activities of Cu/Zn-SOD and glutathione reductase in brain region.